

### **REMARKS**

Applicant wishes to thank the Examiner for the courtesy of a telephone interview conducted on August 9, 2006 with Applicant's representatives. During the interview, the rejections of the claims were discussed, and potential claim amendments were also discussed.

Claims 1-17 are pending. Claim 1 is amended. Support for the amendments to claim can be found throughout the specification as filed, (e.g. see page 5, line 17 – page 6, line 2; page 6, lines 16-24; page 69, lines 1-18; page 74, lines 16-23) and no new matter is presented. Applicant appreciates the Examiner's thorough examination of the subject application and requests reconsideration of the subject application based on the following remarks.

#### **1. 35 U.S.C. §112 Rejections**

Claims 1-4 and 17 are rejected under 35 U.S.C. §112, second paragraph.

While Applicants believe that the claims are clear as they read, Applicants have amended claim 1 to expedite prosecution. In particular, claim 1 recites that an amount of the ink supplied into the ink supplying path per minute is set such that a signal to noise ratio of a detection signal produced by the electrode is not lowered even when an air bubble is created in the ink supplying path. Thus, the terminology objected to by the Office has been deleted. With respect to how the signal to noise ratio is produced, Applicants respectfully submit that the signal to noise ratio is a ratio of the signal to the background noise and is a value that is detected or measured by the electrode.

#### **2. 35 U.S.C. §103 Rejections**

Claims 1-3, 10, 13-14, and 16-17 are rejected under 35 U.S.C. §103(a) over Sugimoto et al. (US 5,565,899) and Nagasaki et al. (US 6,036,305). Applicants respectfully traverse.

#### ***Claim 1***

Applicants claim, in independent claim 1, an image forming apparatus, comprising an ink storage section for storing ink therein; an ink supplying path for supplying, to a print head, the

ink stored in the ink storage section; and an electrode for detecting whether the ink is present or absent in the ink supplying path, wherein an amount of the ink supplied into the ink supplying path per minute is set such that a signal to noise ratio of a detection signal produced by the electrode is not lowered even when an air bubble is created in the ink supplying path, and such that an ink depletion accuracy of the electrode is not lowered even if an air bubble is created in the ink supplying path.

The Office acknowledges in the May 10, 2006 Office action that:

Sugimoto et al. does not disclose that an amount of ink supplied into the ink supplying path per minute is such that a predetermined S/N ratio of a detection signal produced by the electrode is satisfied, a filter in the ink supplying path has a water-repelling property and an amount of ink supplied into the ink supplying path is 1.0cc.

Thus, as acknowledged by the Office, Sugimoto et al does not teach all the claim limitations. The next inquiry is whether Sugimoto in combination with Nagasaki, suggests all the claim limitations – if it does not, then a *prima facie* case of obviousness has not been established. MPEP §2143.

The Office asserts that:

In order to detect the present/absent of ink and process the detection signal, the S/N ratio of this signal should be equal or greater than a predetermined ratio which is set by selecting the gain of the detection signal or adjusting the ink flow. Thus, adjusting the amount of ink (ink flow) for providing a predetermined S/N ratio as claimed is considered to be a matter of a design expedient... and that it would be obvious... to adjust the ink flow of Sugimoto et al as claimed for the purpose accommodating with the gain of electrode and the size and shape of the ink cartridge so that an optimum detection signal would be generated. (page 3 of the May 10, 2006 Office action)

Applicants respectfully submit that the Office is using impermissible hindsight reasoning in making this assertion and, further, that the Office's assertion is misplaced.

Applicants are not merely adjusting ink flow so as to generate an optimum detection signal. Rather, Applicants have found that the ink flow and signal to noise ratio can be

manipulated so the electrodes do not incorrectly detect depletion of ink as a result of air bubbles in the ink supply path.

As set out by Applicants, one can detect ink in the ink supply path by using a current flowing between electrodes. If ink is absent in the ink supply path, no current is allowed to flow between the electrodes, and it is determined that there is no ink. However, sometimes air bubbles form in the ink supply path, which can result in an erroneous determination of ink depletion (see e.g. page 2, line 18 – page 4, line 22).

Applicants teach an apparatus wherein, even if there is an air bubble in the ink supply path, the electrodes are still able to accurately determine whether there is ink remaining. Thus, Applicants do not merely provide an “optimum detection signal” by adjusting ink flow as asserted by the Office. Applicants found that it is possible to maintain the accuracy of ink detection even if there are air bubbles in the ink supply path. In particular, Applicants provide an apparatus that is able to detect the presence or absence of ink, even if there are ink bubbles in the ink supply path, by taking into consideration a combination of the ink flow and the signal to noise ratio. Thus is not at all suggested by Sugimoto. Sugimoto merely describes an apparatus that detects the presence or absence of ink using a resistance measurement. Sugimoto does not at all teach or suggest how or if one can prevent an erroneous detection (due to air bubbles) that ink has been depleted.

Further, the Office merely asserts that it would be obvious to adjust ink flow so as to generate an “optimum detection signal”. Regardless of whether an “optimum detection signal” can be generated using ink flow, there still is no teaching in Sugimoto as to how and if the detection signal accuracy can be maintained in the case where air bubbles are present in the ink supply path.

Nagasaki does not remedy the deficiencies of Sugimoto. Nagasaki does not at all mention a signal to noise ratio or how and if an ink depletion accuracy of the electrode can be maintained even if an air bubble is created in the ink supplying path.

Accordingly, claim 1 is patentable over Sugimoto and Nagasaki. Claims 2, 3, and 17 depend from claim 1 and, likewise, are patentable over Sugimoto and Nagasaki. Reconsideration and withdrawal of the rejection is respectfully requested.

***Claim 10***

Applicants claim, in independent claim 10, an image forming apparatus, comprising an ink storage section for storing ink therein; an ink supplying path for supplying, to a print head, the ink stored in the ink storage section; an electrode for detecting whether the ink is present or absent in the ink supplying path; and first and second filters in the ink supplying path, wherein the first filter is located upstream to the second filter, and the second filter has a larger filtration accuracy than the first filter.

Filtration accuracy corresponds to the opening sections (mesh) of the filters (e.g. see Fig. 5; page 21, lines 21-25). Different filtration accuracies are provided by different opening or mesh sizes. As set out by Applicants, it can be interpreted that the filtration accuracy is a dimension of a shortest length (dimension of the shortest gap width) of the opening section of the filter (see page 22, lines 11-14). The smaller the openings (mesh), the more accurate the filter is.

Thus, according to claim 10, the second filter (which is downstream the first filter) has a larger filtration accuracy, and thus, smaller openings than the first filter.

Applicants found that providing a downstream filter having a larger filtration accuracy (smaller mesh size/smaller openings) than the upstream filter results in the downstream filter trapping air bubbles generated by the upstream filter (see, e.g. page 77, lines 7-10). A greater ratio between the filtration accuracies of the upstream and downstream filters provides a reduction in size of the air bubble created in the upstream filter (see, e.g. page 78, lines 17-24). Further, an air bubble created by the upstream filter will be reduced in diameter by passing through the downstream filter, which has a smaller mesh size/smaller openings than the upstream

filter. As a result, it is less likely that the electrodes will erroneously detect an absence of ink due to the resulting air bubble.

Applicants respectfully disagree with the Office's assertion that the second filter (700a) of Sugimoto "must have a larger filtration accuracy than the first filter (700)" because it is "placed down stream from the first filter (700) to further filter out particles passing through the first filter."

It is well established that the mere fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). Rather, "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.' " *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)(MPEP §2112)

Sugimoto provides a second filter to prevent ink in the ink passage from retracting back into the ink container due to negative pressure of the absorbing material 900 when sucking action is released. As provided by Sugimoto, if the second the filter 700a is not provided, sucking action sucks ink to the halfway point in the ink supply passage 1600a, but as soon as the sucking action is released, negative pressure of the absorbing material 900 retracts the ink. (See col. 19, lines 21-27) By providing the second filter, a meniscus is formed in the mesh of the filter 700a, which results in the ink being retained in the filter 700a, rather than being retracted back into the ink container. (See col. 19, lines 27-39)

Sugimoto does not teach or suggest that any particular characteristics are required of the filter to achieve this object. Further, Sugimoto does not teach or suggest that the filter is

provided for filtering out material that passed through the first filter. Rather, Sugimoto specifically and explicitly provides the filter for the purpose of retaining ink in the filter to prevent it from being sucked back into the container. Thus, no particular filter mesh/opening size, much less Applicant's claimed second filter having a smaller mesh/opening size than the first filter, is necessarily present in Sugimoto as required to properly establish inherency.

Accordingly, claim 10 is patentable over Sugimoto. Nagasaki does not remedy the deficiencies of Sugimoto as Nagasaki does not teach or suggest a first and second filters having any particular filtration accuracies. Thus, claim 10 is patentable over Sugimoto and Nagasaki. Claims 13, 14, and 16 depend from claim 10 and, likewise, are patentable over Sugimoto and Nagasaki. Reconsideration and withdrawal of the objection is respectfully requested.

### 3. Allowable Subject Matter

Applicants appreciate the notification in the Office Action of allowable subject matter, i.e. that claims 4, 11, 12, and 15 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims, and that claims 5-9 are allowable. Inasmuch as Applicants believe that claims 1 and 10, the base claims of claims 4, 11, 12, and 15, are allowable, claims 4, 11, 12, and 15 have not been amended as requested. Applicants, however, reserve the right to later amend the subject application so as to present any one or more of these claims in independent form.

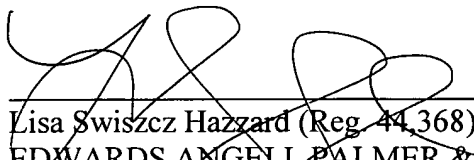
CONCLUSION

It is believed the application is in condition for immediate allowance, which action is earnestly solicited. Should the Examiner wish to discuss any of the amendments and/or remarks made herein, the undersigned attorney would appreciate the opportunity to do so.

If for any reason a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge or credit Deposit Account No. 04-1105 under order no. 60710 (70904).

Respectfully submitted,

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